Fairbanks $PM_{2.5}$ Planning

2nd in a Series:

Modeling and Source Apportionment

August 18, 2011

Overview

- $PM_{2.5}$ and Public Health
- Fairbanks $PM_{2.5}$ Sources
- Methods available to determine source contributions to $PM_{2.5}$ concentrations
- Modeling issues and assessments underway
- Schedule to prepare Plan
- Control measure choices

Overview (cont.)

- Series of Assembly Briefings Planned:
  - Overview and emission inventory development (July)
  - **Modeling/Source apportionment (Today)**
  - Regulatory framework
  - Control Measures
  - Progress towards attainment

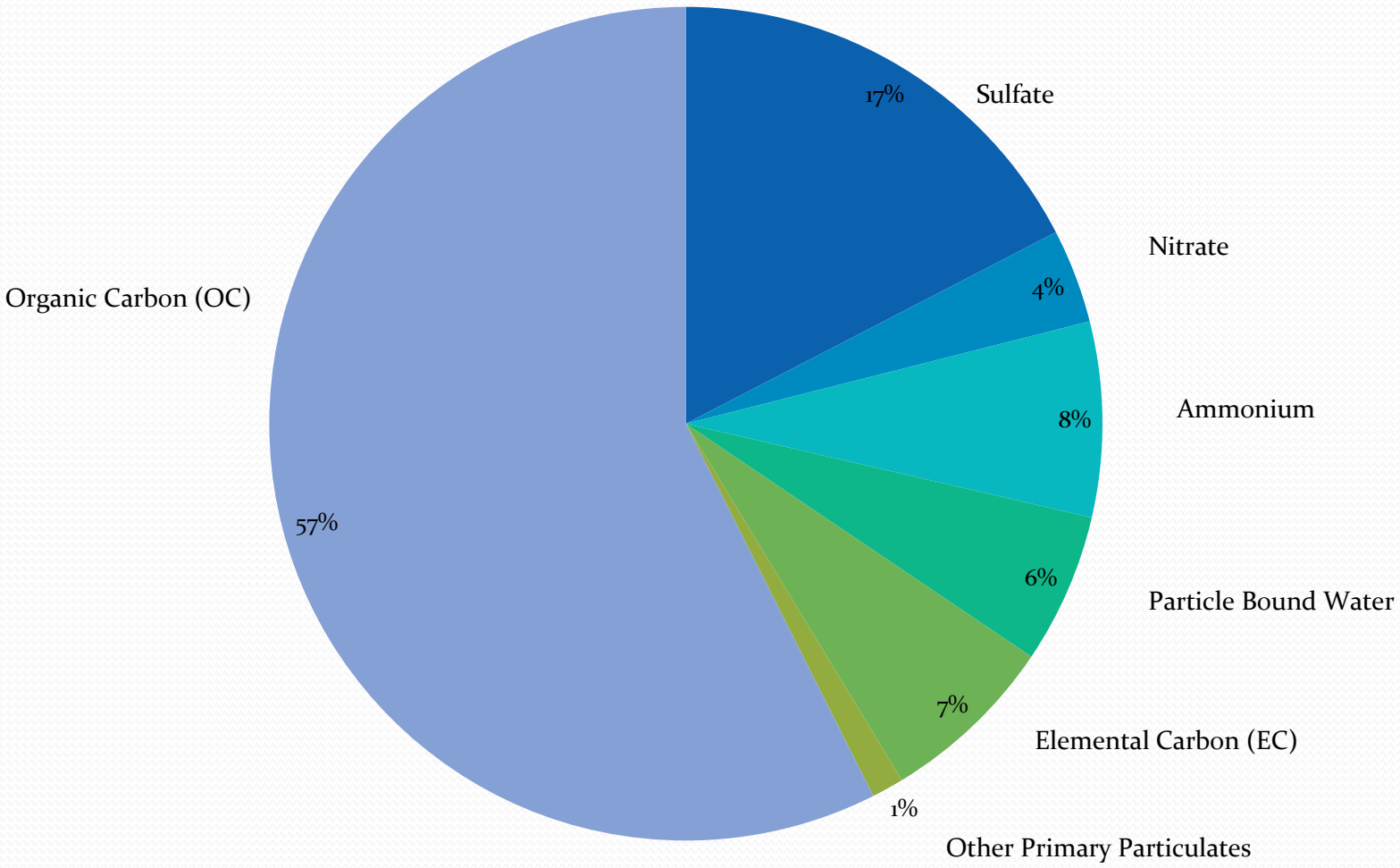
Source Apportionment

- What does it mean?
  - Sources = cars, trucks, power plants, snow machines, wood stoves, oil stoves, etc.
  - Apportionment = % of mass on each filter from each source
- Why is it important?
  - Key to selecting controls is understanding relative contribution from each source
  - Larger sources are more effective targets for controls

Preliminary 2008 Nonattainment Area Emission Estimates by Source (tons per day)

Source	$PM_{2.5}$	SO_2	NOx	VOC	NH_3
Industrial	0.39	7.07	13.03	0.50	0.45
Area	1.82	3.28	1.90	3.62	0.00
On-Road	0.18	0.03	9.53	3.41	0.29
Non-Road	0.10	0.00	0.09	4.47	0.00
Totals	2.49	10.39	24.55	11.99	0.74

Components of $PM_{2.5}$ – Downtown Site



Methods to Determine Sources

- Emissions estimates and meteorology
- Location/common sense
- Statistics
- Chemistry
- Dispersion

How Do We Figure Out Which Sources to Control?

- Magnitude of emissions
- Location in nonattainment area
- Stack height
- Wind direction relative to population and monitors
- Effect of temperature on emissions
- Public versus private
- Cost/ease of control
- Feasibility – Practicality

What Modeling Help Does EPA Offer?

- Support to Borough/DEC on developing models for Fairbanks' Air Quality Plan
  - Meteorological modeling
  - Inventory modeling
  - Configured photochemical model
  - Refined dispersion and receptor models

What Does the EPA Look for in Air Quality Plans?

- Demonstration that science supports interpretation of modeling results and the ability to reach attainment

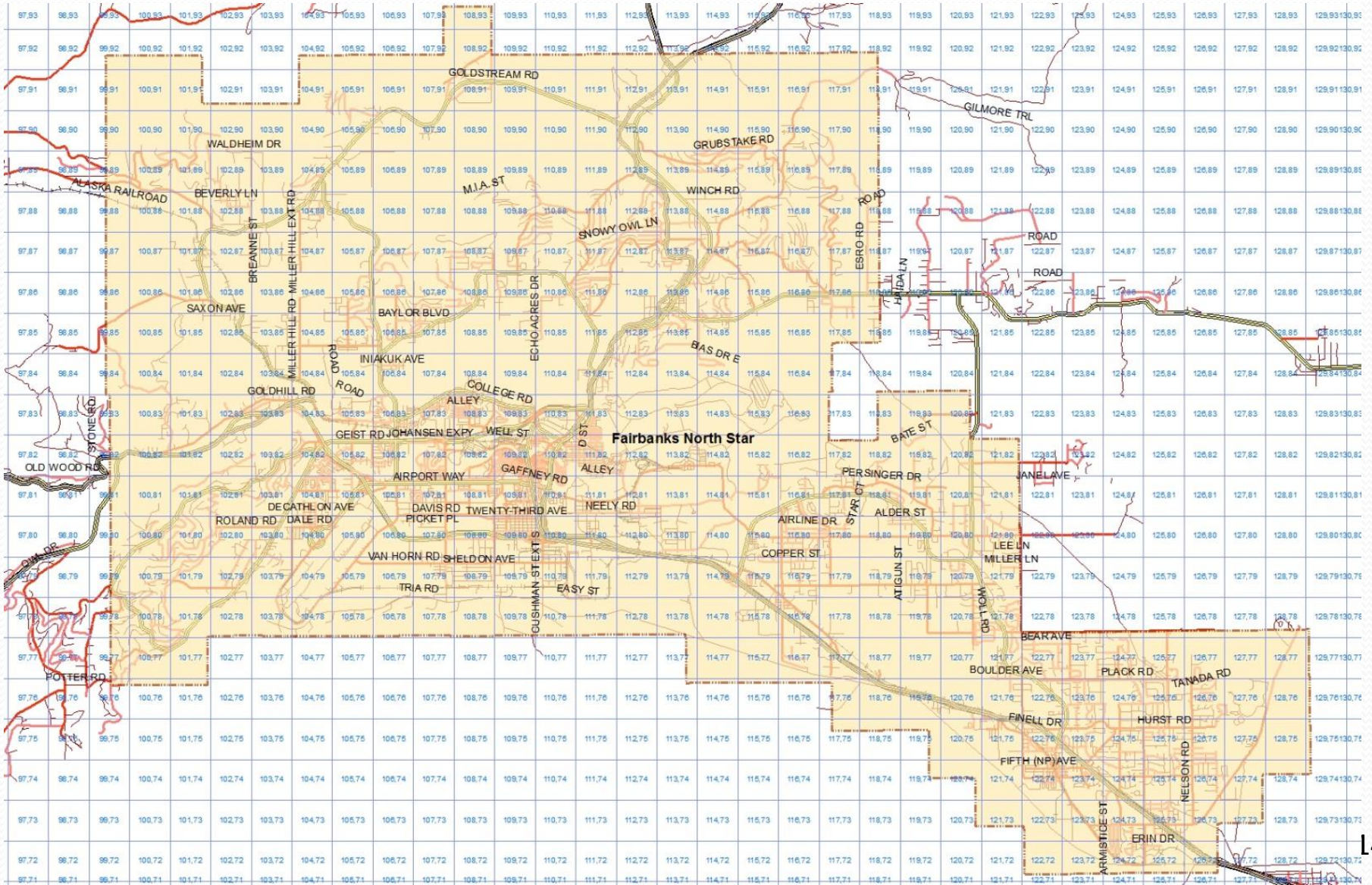
  Collection and use of local data to characterize emissions and meteorology

  Modeling conditions that cause $PM_{2.5}$ violations

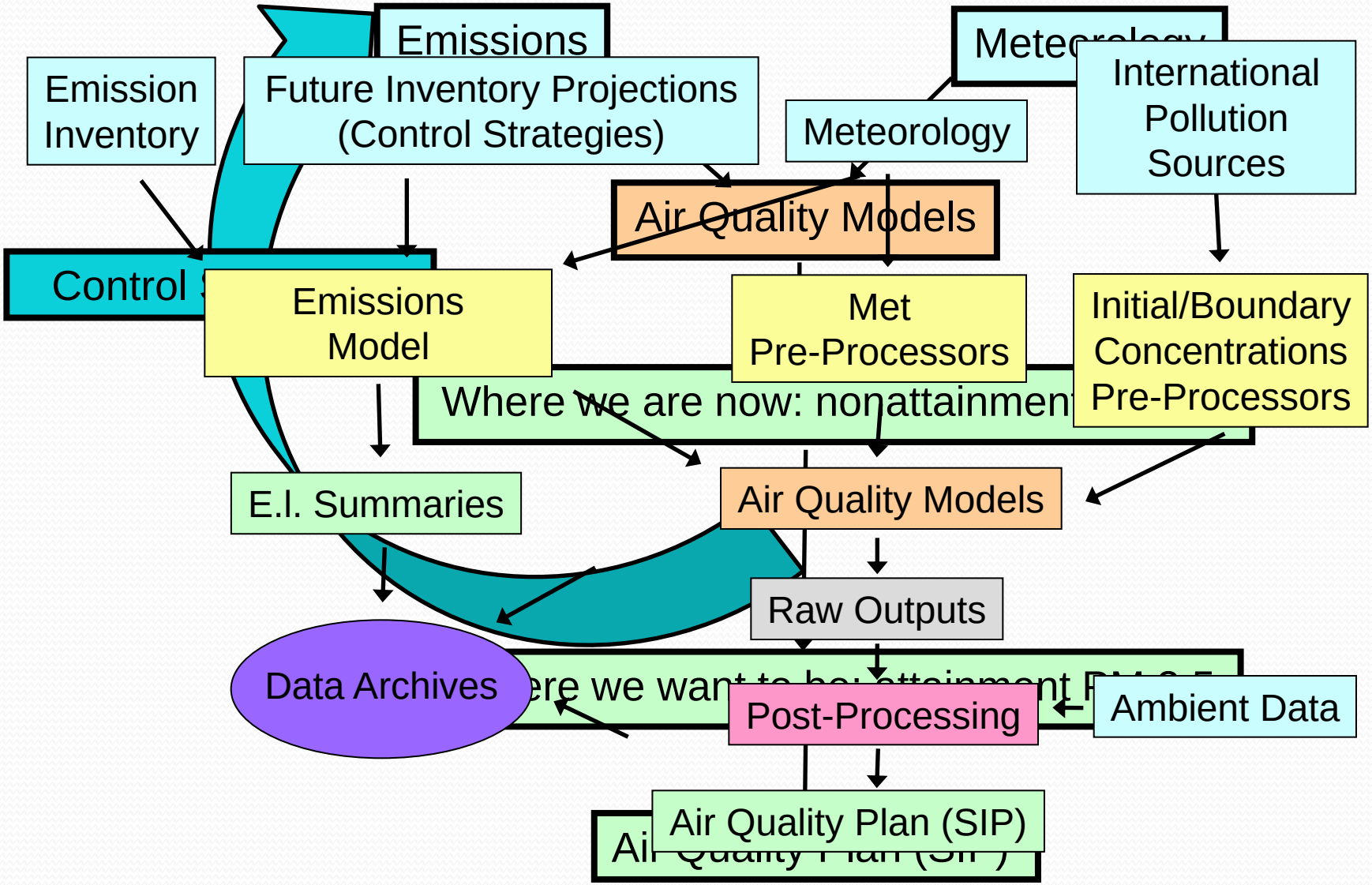
Who's Involved in the Modeling & What are They Doing?

- Borough, DEC and EPA staff – organization, monitor operation, funding, direction & integration
- UAF – air quality modeling, chemical analyses
- Penn State – meteorological modeling
- CCHRC – Space heating fuel use and wood moisture level
- University of Montana – chemical analysis and modeling
- Sierra Research – emissions inventory development and air quality modeling
- Washington University in St Louis – analysis of black carbon measurements
- University of Massachusetts – chemical tracer measurements
- OMNI-Test Laboratories – space heating emission measurements

Fairbanks $PM_{2.5}$ Nonattainment Area Modeling Grid



Modeling Diagram



Key Fairbanks Modeling Steps

(CARS)

Mobile Sources

NOx, VOC, PM, SOx

(POWER PLANTS)

Industrial Sources

NOx, VOC, PM, SOx

(HOME CHIMNEYS)

Area Sources

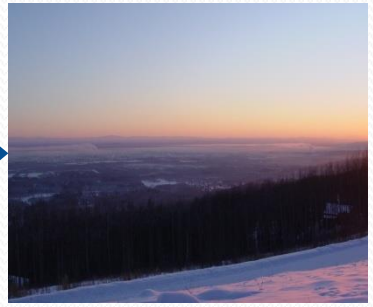
NOx, VOC, PM, SOx

Chemistry

Meteorology

Models

- **Weather**
- **Photo-chemical**
- **Statistical**

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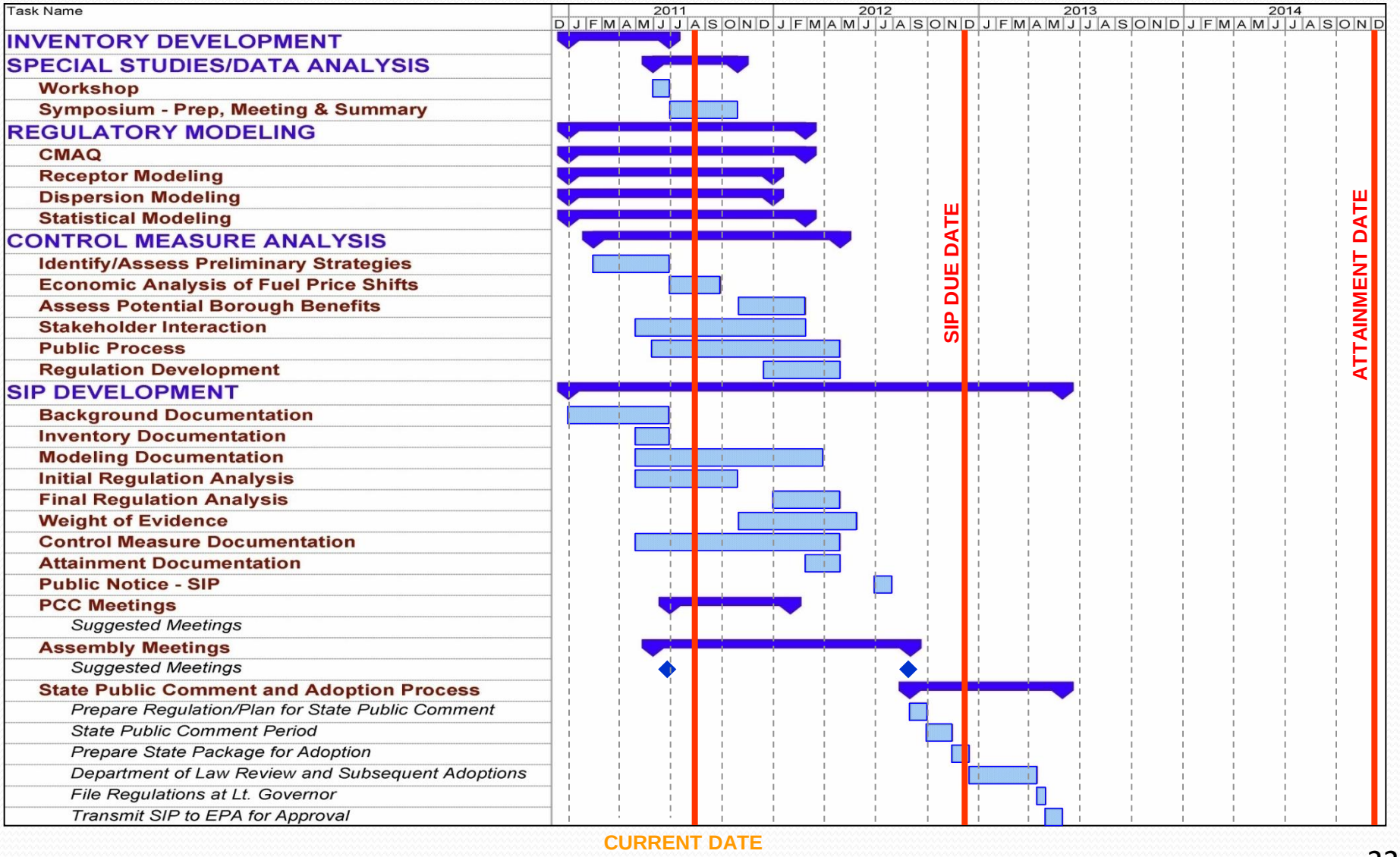
Fairbanks $PM_{2.5}$ Air Quality Plan (SIP) Schedule



Control Measure Issues

- Existing control programs include:
  - Wood stove change out
  - Limit locations where new OWBs can be installed
  - Burn dry wood
  - Public education

- EPA has limits on voluntary measure benefits, additional resources and authority will be need to implement controls
  - Additional control measures will be needed to ensure attainment
  - Continue to look for input from public and Assembly on which measures to use

Options to Reduce Air Pollution

- Local options
  - Wood burning limits (sale of dry wood, etc.)
  - Shift to #1 heating oil as Borough has
  - Diesel retrofits
- State options
  - Wood burning limits (curtailment during episodes)
  - OWB standards
  - Limit wood cutting on public lands to only taking split wood
  - Permitted industrial facility emission controls
  - Large scale natural gas availability (e.g., pipeline)
- Federal options
  - Tighter wood stove standards (technology forcing)
  - National standards on fuels & equipment
  - Additional funds for local programs
- Have to work together to assemble a mix of acceptable measures